Amendments to the Specification

Please amend the paragraph at page 1, lines 9-18 of the Specification as follows:

An image processing system for filtering X-ray fluoroscopic image sequence is already known of a US ~~patent N°~~ Patent No. 5809105. This document discloses means for acquiring one image by passing X-rays through a subject, said image comprising an array of pixel values, means for receiving the image and producing a mask therefrom which distinguishes the pixel values that correspond to structural features in the image from the pixel values that correspond to background and means being responsive to the mask for selectively filtering the pixel values in the image that correspond to background. The means for filtering the background pixel values include a Poisson filter which is spatial filter. So, the mask is used to select the background pixels for filtering the background noise while enabling the structural pixels to pass unfiltered to the display.

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SUMMARY OF THE INVENTION

Please amend the paragraph beginning at page 2, line 22 of the Specification as follows:

A system to carry out said method includes a computer program product comprising a set of instruction for carrying out a method of image processing for noise filtering an image sequence representing a threadlike structure on a background ~~as claimed in claim 1~~; and an examination apparatus with a system and means for carrying out the processing method as claimed in claim 6, including an enhancement operation performed on spatially filtered string point data, comprising steps of: selecting string points [A(i,j)] using the list of the control signal [St(i, j)], enhancing the string point data with respect to their local environment, and constructing a filtered second image data by performing an insertion of the enhanced spatially filtered data of the string points into the temporally filtered data of the background points, controlled by the binary control signal.

Please amend the paragraphs beginning at page 3, lines 6-31 as follows:

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention relates to an image processing method for noise filtering an image sequence representing a threadlike structure, possibly moving on a background, including an

acquisition of the point data in first and second sequence images and an estimation of the corresponding filtered point data to reconstruct a noise filtered second image. By threadlike structure, one understands an elongated shaped object, having a transversal dimension of 1 to 10 pixels, possibly 1 to 3 pixels, in a digital image. The point data are the intensities and co-ordinates of the points in the images.

In an example described hereafter, the invention particularly relates to a noise reduction method applied to a sequence of medical X-ray fluoroscopic noisy images representing a threadlike structure that is a catheter guide-wire on a cluttered background. The image processing method aims at reconstructing an improved sequence of images where the point intensities of the guide-wire are noise filtered and enhanced with respect to a filtered background. One problem lies in the selection of the points that must be both filtered and enhanced as guide-wire points, or that must be filtered as background points, in the sequence images. This problem is solved by an image processing method comprising steps of extracting the guide-wire points, forming strings from said extracted guide-wire points, temporally filtering the points located outside the strings, denoted background points, spatially filtering the

points located on the strings denoting guide-wire points and inserting the spatially filtered guide-wire points in the image of the temporally filtered background points. An other problem lies in the elimination of phantom artifacts. This problem is solved by processing a sequence of two images and by selecting for insertion the guide-wire points that have been located on a string in at least one of the two images. An other problem lies in the lack of contrast of the original images. This problem is solved by applying local intensity enhancement on the spatially filtered guide-wire string points and inserting the resulting enhanced guide-wire string points in the image of the temporally filtered background points.

~~DESCRIPTION OF THE PREFERRED EMBODIMENT~~

Referring to FIG.1, the method comprises the main operations of:

Please amend the paragraph beginning at page 5, lines 9-26 as follows:

In reference to FIG.2A, the guide-wire points are extracted ~~in~~ one image at a time, on a purely spatial basis, that is, regardless of its motion content. To that end, each original

image is first scanned in order to determine whether the current point pertains to the image background BG or to the guide-wire GW. Then each guide-wire point is extracted. In reference to FIG.2B, based on the extracted points, strings of points are formed in order to eliminate guide-wire boundary points and to keep guide-wire central points for further processing. ~~in~~ In reference to FIG.1, a recursive temporal filtering RTPF is applied to those points that are not extracted as string points and thus are denoted background points, whereas a spatial filtering SPF1 is applied to those points that are extracted as guide-wire string points. So, at a string point location, which is a guide-wire point location, as the probability of movement is high, no temporal filtering is performed; instead, a spatial filtering is performed; whereas, at a non-string point location, which is regarded as a background point location, as the probability of movement is low, temporal filtering is allowed to be performed. FIG.1 shows diagrammatically the detailed steps of the processing method for noise reduction in the images of a sequence representing a moving guide-wire as described above. This method provides a final filtered sample denoted OUFt relative to each current point at a location i, j for

reconstructing a filtered image at time t from the samples Xt-1, Xt of the causal and present images. These detailed steps are: